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COMPOSITION OF FEEDING STUFFS ON THE CANADIAN MARKET - EVIDENCE OF FRANK T. SHUTT, M.A.,
CHEMIST TO THE DOMINION EXPERIMENTAL FARMS - 1909

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Canada. Agriculture and Colonization,
in Select Standing Committee on, 1909

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OF

FRANK T. SHUTT, M.A.

CHEMIST TO THE DOMINION EXPERIMENTAL FARMS

BEFORE THE

SELECT STANDING COMMITTEE

ON

AGRICULTURE AND COLONIZATION

1909

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COMPOSITION OF FEEDING STUFFS ON THE CANADIAN MARKET.

HOUSE OF COMMONS,

COMMITTEE ROOM No. 62,

WEDNESDAY, March 3, 1909.

The Select Standing Committee on Agriculture and Colonization met this day at 11 o'clock, Mr. Schell, chairman, presiding.

The CHAIRMAN.—I have much pleasure in welcoming Professor Shutt, Chemist of the Dominion Experimental Farms, who will address the Committee on the topics set forth in the addenda paper which has been distributed to members.

Mr. SHUTT.—Mr. Chairman and gentlemen,—It is always a matter of some difficulty to select, from the work of the year, subjects for discussion at this Committee, for there is so much of importance and interest in that work that might be brought before you. As years go by our field of labour widens, our work increases, the investigations become more numerous and consequently this difficulty increases rather than diminishes. It seems to me, on thinking over the matter, that it would be well on this occasion, after indicating in a general way the character and scope of our chemical work, to devote this session more particularly, to the discussion of the feeding stuffs on the Canadian market—a subject which at the present time is one of considerable interest to the agricultural community.

Although your Chairman has been good enough to say I am to deliver an address, the fact is that I am rather to give evidence and testimony and, therefore, I shall not regard it as any interruption if you ask questions relative to the subject we are discussing. My purpose here is to answer questions and to give information and I shall be very pleased to do so to the best of my ability. Naturally, I am anxious that you should be aware of what we are doing and how our chemical investigations are influencing and benefiting Canadian agriculture.

Our general policy as regards the work of the chemical division remains unchanged. As from the institution of the experimental farms, we endeavour in the first place to be as useful as possible to the practical farmer in his everyday work, to get into close touch with those who are tilling the soil, to be as helpful as ever we can to the individual, and secondly, to carry out such investigations and researches by the aid of chemistry as may tend to solve the problems which are confronting the grain grower, the fruit grower, the dairyman, &c., in one or other parts of the Dominion. The results of such investigations are as a rule of more or less general interest. You will notice, therefore, that our work falls into two broad classes; that which has to do more or less directly with the interests of the individual farmer, and secondly that which undertakes the investigation of problems in connection with Canadian agriculture generally. But there is no hard and fast line of demarkation between these two classes of work; in fact, frequently the inquiries or samples sent by farmers have prompted and suggested lines of investigations. With regard to the work which we do for the farmers directly and as individuals, very few of the results appear in our annual reports and bulletins. Nevertheless, I feel that it is an extremely important branch of our work because it is directly useful, directly educational. It is carried out largely by correspondence. We act as a 'Correspondence School,' to whom all may apply free. We are a national 'bureau of information' in matters agricultural. As you are aware there is no postage required on

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letters addressed to the officers of the Experimental Farm at Ottawa. That no doubt is one of the reasons why the correspondence in all branches of the farm work is so large. This answering of questions, is I believe, a feature that is very popular throughout the country. Possibly you may think that the ordinary farmer knows very little with regard to the relationship, the bearing, of chemistry to agriculture, yet we have now a correspondence in the chemical division of something like 3,000 letters a year. There are inquiries from farmers all over the Dominion and relate to soils and their treatment, manures and fertilizers and their application, the relative value of cattle foods and the compounding of rations, to the quality of the drinking supply on the farm, to the nature and preparation of insecticides and fungicides and a whole host of other matters in which chemistry can be of assistance to the farmer or agricultural specialist in his daily work. Then, in addition to this correspondence (which necessarily consumes a very large part of my own time to attend to) we do what we can in the examination of samples forwarded by farmers. We do not undertake—it would not be possible nor desirable—to make a complete analysis of every sample of an agricultural nature that is sent in to us. It is a matter in which we must use judgment and discretion. Last year in the neighbourhood of some 600 samples were sent to the farm laboratory, consisting of soils, mucks, peats, marls and other materials which we may consider as naturally occurring fertilizers, cattle foods, insecticides and samples from farm water supplies. This may serve as a rough classification of the various materials which are being forwarded by farmers for analysis or examination. We thus endeavour to carry on, side by side, educational work with that of research—a plan which I believe is well suited to the needs of a comparatively new country. It has, we think, been fruitful of good results.

THE RELATIVE VALUE OF FEEDING STUFFS.

And now, having outlined our work, I propose with your permission, to discuss a subject that is attracting a good deal of attention to-day and upon which we have spent much time, namely, the feeding stuffs as found upon the markets of Canada.

By Mr. Broder:

Q. Do you publish the results of these analyses after they are made?

A. The greater number of them but not necessarily all of them. Those which we deem of sufficient interest to the community as a whole we publish in our annual report. For instance, in connection with the feeding stuffs we publish practically all our data but we do not burden our pages with material which would not be of general interest.

This is not the first time, gentlemen, that I have brought before the Committee the subject of the concentrated cattle feeds as found on our markets. For a number of years we have every season examined those samples which have been forwarded to us in order to furnish the sender with information as to the relative feeding values of these feeds, but during the past winter, more particularly, the interest in this matter has become more keen and there has been an increased demand for information bearing on these materials. There are perhaps two reasons for this interest. In the first place we have in many districts in Eastern Canada, experienced during the past three years, seasons of greater or less drought and that has necessarily meant a shortage in fodder and forage crops. As a consequence the farmers, stock feeders and dairymen have had to purchase larger quantities than usual of these concentrated feeds in order to supplement the home grown fodders and secondly, there is a greater number of these materials now upon the market by reason of the fact that certain classes of manufacture that give rise to by-products of feeding value, have multiplied.

Now, in the first place it is well to understand clearly what a farmer or dairyman purchases his feed for, that is, the particular nutrient or nutrients he wishes to purchase. You will say he naturally wants to get the best, that is, the most nu-

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trititious feed that he can pay for his money. Certainly. He looks about him, gets the market prices and considers as well as he can the nutritive value of such materials as are available to him. His experience as a farmer helps him greatly in making a choice. He has necessarily familiarized himself with a large number of these materials, such as bran and shorts. These he feels himself fairly competent to decide upon as to their approximate feeding value. But when he comes to a number of these milling and by-products that are offered him then he is more or less in doubt as to their value; he cannot tell from the mere appearance of many of them, and more particularly as the greater number of these materials are ground very finely, what their nutritive qualities may be. He must then resort to the chemist in order to learn the composition and properties of these feeds. We have, for instance, upon the market a number of by-products from the starch and glucose factories. There are four such factories in Ontario and their products include gluten meal, gluten feed, corn oil cake and corn bran. Several of these products are extremely rich and valuable but others are comparatively poor. We find that the feeds on the market show great variation in quality. Then there are the products of the oat meal mills and the 'breakfast food' factories, and in this connection I may point out that although oatmeal is a material in itself of high nutritive value, we have upon the market various products from such mills, some of which are comparatively worthless. I refer to feeds consisting largely of oat hulls. Then we have mixed feeds prepared from these milling products which are judiciously compounded, containing a certain proportion of crushed oats and crushed corn. In this way an attractive appearance is given to these materials, and they are put upon the market. I am afraid many of them are such as to deceive, at any rate they have an appearance which belies their true nutritive value. Many of them contain sweepings, weed seeds, &c. Then we have the by-products from the sugar beet factories. We have the dried exhausted pulp and that is put upon the market as such or in conjunction with molasses. Molasses also is fed in some districts and this may be mixed with peat, the peat being used as an absorbent to hold the molasses. The molasses is a by-product in the manufacture of beet sugar and also in the refining of cane sugar. We have also by-products from the manufacture of pearl barley and split pease and other articles intended for human consumption. The number of these by-products and milling products is constantly on the increase.

You will have inferred from what I have said that while many of these products are extremely valuable, as feeds, there are others comparatively poor, and still others practically worthless, and we wish to be able to inform the farmer where these various feeds stand relatively one to another. The farmer buys these concentrated feeds chiefly for the amount of protein or albuminoids they contain, as protein is the most valuable nutrient in a feeding stuff. Secondly, he wishes to know the percentage of fat they contain.

We may spend a few minutes in considering the constituents of a fodder or feeding stuff. There is first of all water. In ordinary dry meals, the concentrates as they are sometimes called, the moisture or water, may not exceed 10 per cent, it may be even lower than 10 per cent. In feeding stuffs such as we are considering the limit will be 8 per cent and 12 per cent, the lower the moisture content, other things being equal, the more valuable the feed. In the coarse fodders grown upon the farm, such as roots and ensilage, the percentage of water will be from 70 to 80 or even higher.

Protein or albuminoids. These terms include the nitrogenous compounds of a fodder. Protein, as I have said, constitutes the most valuable part of a feed. In the animal economy it is that which goes to repair the waste of the tissues, which furnishes the material to form the muscle (meat), the blood, the curd of the milk, &c. There is no other constituent in a fodder that can take its place for these purposes. The animal must have a certain proportion of protein daily in order to grow, to thrive, to give milk, &c. Now the home grown fodders—such as ensilage, roots,

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timothy hay, &c.—are all materials which are comparatively low in protein. Consequently when a farmer purchases a meal he should look first of all for protein. He seeks to balance up the ration (as it is termed), to purchase a material with a high protein content in order to furnish the muscle and blood forming material in which his own fodders are more or less deficient. There is no substitute for protein, and therefore the intelligent feeder who is purchasing feeds inquires, first, what is the percentage of protein in the fodder offered to him.

Thirdly, the percentage of fat. Fat is a fattening agent of high value, that is to say, it may be converted more or less directly into the adipose tissue of the animal or made use of for the production of fat in the milk, as the case may be. It also is valuable for the production of heat and energy within the animal; it enables the animal to keep up its body temperature and to do hard work—it reduces the amount of protein otherwise necessary. Fat, therefore, stands next to protein—in fact in certain instances—according to the function of the animal, it may be fully equal in value to the protein.

Next we have the carbohydrates. It is a chemical term to include starch and materials closely allied to starch chemically. Starch does not form muscle, or blood, or the curd of milk, or wool, but it furnishes by its combustion within the body the heat which is necessary for the existence of the animal. It is also a producer of energy or the capacity of work within the animal. But it is well to remember starch has not the same value as fat, weight for weight, as a heat and energy producer. Approximately one pound of fat is equal to two and one half pounds of starch for these purposes.

Fifth, we find fibre. Of all the organic nutrients in a fodder, fibre has the lowest feeding value. As a rule, fodder which has a high percentage of fibre has a low feeding value. Fibre in so far as it is digestible, is used by the animal in the same way as starch but, in the majority of feeds the fibre is largely indigestible and is consequently valueless for the nutrition of the animal, though it may be of some service in giving bulk to the feed—a point of some importance. But the farmers' coarse fodders always supply a sufficiency of this constituent and there is no reason for purchasing it.

Lastly, there is mineral matter, or as we term it ash, which goes to build up the frame work, the bone of the animal and to furnish the small amount of mineral matter (lime, phosphoric acid, &c.) which is found in the various tissues of the body. There is always a sufficiency of ash in the home grown fodders to supply the needs of the animals.

FEEDING STUFFS analysed at the Experimental Farm, Ottawa, 1907-08—Continued.

Name of Feed.	Particulars (Manufacturer or Sender).	Moisture.	Crude Protein.	Fat or Oil.	Carbo-hydrates.	Fibre.	Ash.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Pea products— <i>Con.</i>							
Pea meal.....	Jas. Wilson & Sons, Fergus, Ont. (manufacturer).....	7.70	17.37	1.32	49.49	21.45	2.67
Pea bran (pure hulls).....	" " " ".....	5.54	5.63	0.44	34.65	51.29	2.45
Split peas (without hulls).....	" " " ".....	6.43	27.69	0.94	61.46	0.97	2.51
Cottouseed meals—							
Cottouseed meal, 1907.....	Jos. Ward & Co., Montreal, Que.	9.88	36.69	6.82	27.99	12.17	6.45
" " " " 1908.....	Lefebvre & Mahon, Howick, Que.	7.73	38.87	10.41	26.81	9.64	6.51
" " " " from Barba-	E. B. Elderkin, Amherst, N.S. (sender).....	10.73	26.50	5.84	30.83	19.97	6.13
does, 1907.....	" " " ".....						
Cottouseed meal from Barba-	" " " ".....	7.82	26.06	4.17	38.34	18.69	4.92
does, 1908.....							
Cottouseed meal.....	R. J. Messenger, Bridgetown, N.S. (sender).....	5.86	37.62	7.91	32.29	9.87	6.45
" " " " (Owl brand).....	F. W. Broder & Co., Memphis, Tenn. (manufacturer), per D. E. Taylor.....	5.81	40.74	9.93	28.06	8.04	7.42
" " " " (Soper's choice).....	J. E. Soper & Co., Boston, Mass. (manufacturer), per D. E. Taylor.....	8.35	43.68	8.07	26.35	6.75	6.80
Linseed products—							
Linseed oil cake feed.....	Midland Linseed Co., Minn.		31.75	9.91			
" meal.....	Sherwin Williams Co., Montreal, Que. ".....	6.84	32.43	16.56	31.84	7.16	5.17
Moulée feed.....	Canada Linseed Oils Mills Co., Graham, Que. (manufacturer) per J. J. Riley.....	8.37	11.56	9.71	47.55	18.09	4.72
Miscellaneous Feeding Stuffs—							
Ground feed from flax screenings.....	J. G. King & Co., Port Arthur, Ont. (manufacturer).....	7.39	13.88	11.71	45.29	15.30	6.43
Flax refuse (before grinding).....	" " " ".....	5.54	9.05	5.23	40.13	25.04	9.00
Fine flax screenings No. 3.....	" " " ".....	5.77	17.44	18.41	29.55	12.85	15.98
Small seeds from wheat.....	" " " ".....	7.20	16.44	10.53	45.40	16.02	4.41
Feed from wheat and flax screenings.....	" " " ".....						
Molasses.....	Dominion Molasses Co., Halifax, N.S. (manufacturer).....	10.57	12.18	5.90	53.74	12.35	5.26
Molaskat feed.....	F. A. Dixon, Sackville, N.B. (sender).....	23.42	1.44		61.18		6.12
National molasses stock food.....	Wallaceburg Sugar Co., Wallaceburg, Ont. (manufacturer).....	16.18	2.56	0.37	66.81	6.68	7.40
" " " ".....	E. G. Campbell, Lower Steviacke, N.S. (sender).....	18.72	9.81	0.66	54.92	9.52	6.37
Paddy rice.....	Blacking & Mercantile Co., Amherst, N.S. (sender).....	6.77	11.05	0.53	63.77	11.24	6.66
Distillery slop.....	J. A. Gaulin, Mastat, Que. (sender).....	11.65	6.69	2.20	61.20	11.63	8.62
Algoma feed.....	F. E. Came, Sault au Recollet, Que. (sender).....	95.41	1.23	0.16			
Cyphers-Daniels egg mash.....	Jos. Tardif, St. Louis, Montreal, Que. (sender).....	8.27	13.25	6.98	57.59	9.58	5.23
Bents milk albumen No. 1.....	R. A. A. Johnston, Ottawa, Ont. (sender).....	8.01	21.75	3.64	53.04	8.92	4.64
" " " " No. 2.....	" " " ".....	8.39	41.21	1.45	16.61		32.34
			72.43				2.31

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In this very brief review of the constituents of a fodder, I have intended chiefly to emphasize that the percentages of protein and fat in a feed must determine the feed's value to the farmer, as he will use the feed to supplement deficiencies in these constituents in his own home-grown coarse fodders. If he has a knowledge respecting the percentage of protein and fat in the feeds offered him he will be enabled to buy his feeds to the best advantage. With these few words of explanation, which I shall be pleased to amplify if any member desires, I wish to speak about these several classes of feeds, to which I have referred and examples of many of which I have brought with me to show you.

CORN PRODUCTS.

First we may consider the by-products from the starch and glucose factories. All manufacturers do not adopt precisely the same terms for these products, but the following are generally recognized in the trade. Gluten meal, especially rich in protein: Gluten feed, consisting chiefly of the gluten and corn bran mixed and containing much less protein than gluten meal. Corn oil cake, rich in gluten and oil, consisting of the corn germ from which the greater part of the oil has been expressed, and corn bran or the hull of the corn, with a very low feeding value. Their composition is set forth in the following table. The results are average, from the analysis of good samples.

CORN AND CORN PRODUCTS.

	Moisture.	Protein.	Fat.	Carbo- hydrates.	Fibre.	Ash.
	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Corn.....	10·6	10·3	5·0	70·4	2·2	1·5
Corn-meal.....	15·0	9·2	3·8	68·7	1·9	1·4
Gluten meal.....	10·5	34·75	5·58	46·92	1·77	0·48
Corn germ.....	10·7	9·8	7·4	64·0	4·1	4·0
Corn bran.....	5·54	11·47	4·53	59·49	17·95	1·02
Corn oil cake.....	6·95	26·56	14·40	40·00	10·46	1·63
Gluten feed.....	7·8	24·0	10·06	51·2	5·3	1·1

By Mr. Owen:

Q. Are these feeds for producing beef or milk?

A. They may be used for both classes of stock. The materials which go to form the casein of milk will also be useful in the formation of the muscle or flesh in the animal which is being fed for beef. It is the very same class of nutrient (protein) which is required for both purposes.

I may add a few words of explanation regarding these products. In the separation of the starch from the corn kernel, which, of course, is the primary object of the manufacturer, he finds that the residue may be divided into certain classes. These he may sell separately or he may mix them. In the latter case you have 'Gluten feed' which is not so rich in protein as 'Gluten meal,' because it contains the bran of the corn which is of poor feeding quality. Gluten meal, properly so called, consists very largely of the protein

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of the corn and is consequently the most valuable of all the by-products. The bran, or husk, or hull of corn is, as I have said, not of high feeding value. The embryo, or germ, separated in the process of manufacture, is very rich in oil. This oil is expressed by means of high temperatures and hydraulic pressure and the residue is known as corn oil cake, a sample of which I hold in my hand. This may be ground and sold as corn oil cake meal. It is a high class product. We have therefore, gluten meal representing the gluten or protein; corn oil cake as representing the embryo minus the larger proportion of the fat; and corn bran, a material of comparatively low feeding value. Gluten feed is a mixture, with a more or less variable amount of protein because it contains more or less corn bran. We must be careful therefore, to distinguish between that which should be rightly called gluten meal and gluten feed. Gluten meal is the gluten only, a material of high feeding value and should contain no corn bran. Gluten feed, on the other hand, is a term which designates a material made by mixing these by-products together.

Now, upon this chart (pointing to a chart on the wall) I give one or two analyses representing the products of several of our starch factories, and you will notice, not only considerable difference in protein content but that what is really gluten feed is in one case being sold under the name of gluten meal. Gluten meal, should, as I have said, contain in the neighbourhood of 30 per cent protein, but the 'Jersey brand gluten meal' contains not more than 18 per cent, and frequently much less. Occasionally I have found a gluten feed run as low as 12 per cent of protein. Now the point is this: if a gluten feed is sold as gluten meal and the farmer has no means of knowing that it is gluten feed, a species of fraud is being perpetrated. Perhaps I should not say fraud, for of course a manufacturer may sell his feed under what name he pleases, so long as he does not infringe the copyright law. There is no provision by law that a gluten meal should contain a certain percentage of protein; nevertheless the fact remains that there are genuine gluten meals on the market and that there is a material being sold as gluten meal—I hold it in my hand now, which is made by one of the factories—and which is not a gluten meal at all, but simply a gluten feed. It does not contain much more than half the amount of protein which a true gluten feed should contain.

By Mr. Smith (North Middlesex):

Q. Was that a gluten feed which you had in your hand last?

A. It is sold as a gluten meal, but is in reality a gluten feed. I show you now a true gluten meal.

Q. There is quite a difference in the colour?

A. Yes, there is. On inspection a gluten feed can be distinguished from a gluten meal, though the percentages of protein could not be ascertained.

By Mr. Sermith:

Q. Are those two feeds on the market now?

A. Yes, sir, those are on the market now, with several others.

Q. Do they sell this gluten feed at the same price as gluten meal? It seems to me there ought to be some way of preventing a fraud like that?

A. That is just what I am coming to.

Q. That is a ridiculous thing?

A. Yes, sir. It is just for that very reason that I am bringing this matter before the committee.

By Mr. Wright:

Q. Supposing a farmer wishes to find out the actual feeding value of a product that he is buying. If he sends it down to you do you give him an analysis of it?

A. Yes, but, of course, we ask that he shall furnish us with all information as to the manufacturer and vendor so that we can use that information for the agricultural public if we wish to do so.

Now you must not suppose that I am making a statement against the manufacturers generally. There are many honest and reputable manufacturers and they naturally wish to sell their material at the highest possible price. There is no law in this country, however, to prevent the sale of inferior feeds under names usually attached to feeds of high feeding value. Nor do I think we could enact such a law; but what I do wish to see is some enactment that will compel the manufacturers to state the percentages of protein and fat the feed contains. I have brought this subject before the committee on several occasions and I think the time is now ripe to consider it with a view to some legislation that would protect the farmers' interests and I see no plan that would do so effectively as making the manufacturers 'tag' his products, giving the protein and fat content. I might say that this matter has not only been brought to our attention by the purchasers of feeds but also by the manufacturers of reputation. Certain of the manufacturers have pointed out to me that they are putting a good material on the market whereas materials under the same name are offered to the public the actual value of which the public have very little means of judging but which are of decidedly inferior quality.

By Mr. Broder:

Q. Are these products obtained by taking more out of the grain or mixing something with it?

A. They are obtained by extracting the starch from the corn. In the gluten meal we have chiefly the protein of the corn, but in the gluten feed we have not only that but the bran.

Q. It brings the average down?

A. Exactly, it brings the percentage of protein down.

The practical conclusion from this is, that the sale of concentrated feed stuffs should be under the control and inspection of some branch of the government service, that these materials should be sold and be subject to inspection in the same way as our fertilizers are. May I repeat. The ground that I take is this: fertilizers are plant food, these materials are cattle feeds, and if it is desirable and necessary to protect the interests of the farmer with respect to the composition of commercial fertilizers it is equally important to protect his interests in connection with the composition of cattle feeds, and possibly more so, because where there is one farmer who buys commercial fertilizers there certainly must be ten farmers who buy cattle feeds.

By Mr. Broder:

Q. In the county I represent a great deal of feed is bought.

A. Undoubtedly a large quantity of these feeds is used by the farmers, and as I have said, many of the purchasers have not much experience in judging the feeding stuffs at their true value. Further, an analysis is absolutely necessary in many instances—You can tell but little by merely inspecting the feeds, especially if finely ground.

By Mr. Smith (Middlesex):

Q. Could not a farmer by mixing corn with other feeds of higher feeding value arrive at the same result?

A. Possibly so, but that would depend—to do it profitably—very largely upon the part of Canada in which he lived; I do not think it would pay him to grow corn in this (Ottawa) district, that is, for grain. In this district we grow corn for ensilage purposes but not for grain. There is a very much higher percentage of protein (which

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is the material the farmer is looking for) in gluten meal than there is in corn as a whole, simply because the manufacturer has taken out the non-nitrogenous parts, the starch; the part which is of comparatively little value to the farmer has been extracted and sold as starch to be used for other purposes, and that which is left behind is far more valuable for feeding purposes than the whole grain.

By Mr. Broder:

Q. The farmer cannot understand that very well and wonders how it is that the more you take away the more you have left.

A. It ought not to be a very difficult matter to explain to him that what he needs to buy is chiefly protein and that taking the starch from the corn leaves its protein as a by-product.

By Mr. Sexsmith:

Q. I understand that they grind up oat hulls and mill sweepings and mix them with the shorts?

A. So they do at times and we have had some feeds of that character sent to us.

Q. And the farmers buy it and pay the price of shorts for it?

A. Presumably so.

By Mr. Blain:

Q. Is there much increase in the sale of this class of feed?

A. There is I think; the factories can dispose of all they have quite easily and readily at good prices. As I have told you there is a scarcity of fodder owing to the drought last year and men have to buy larger quantities than usual to supplement their supply of home-grown fodders.

Q. There is a scarcity of fodder you think?

A. Yes, for the reason I have stated and further, I think the increase in the dairy-ing and feeding industries generally has also affected the demand. It is an advantage to use feeds with high protein content, if used judiciously, for undoubtedly the land is thereby improved. The manure produced from these high class feeds is very valuable and serves to maintain the fertility of the soil.

By Mr. Owen:

Q. Do you issue pamphlets giving your valuable knowledge on these foods to the public?

A. Do you refer to special bulletins on feeding stuffs?

Q. Yes.

A. We have only published the analyses of these foods in our annual reports.

Q. Would it not be better to put it in the form of a pamphlet and distribute it among the farmers for their benefit?

A. It might be, but I must point out to you that we haven't the machinery in the Department of Agriculture to make an official collection of such foods as may be found in every part of Canada. The Experimental Farm has no machinery for making such a collection.

By Mr. Broder:

Q. The Inland Revenue Department has? What do you propose?

A. Yes, the Inland Revenue Department has. My position is, that all the materials offered as feeds, that is sold at over \$10 per ton, should bear a tag upon which should be printed plainly the percentages of protein and fat which that food

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contains. Our analyses are merely of such samples as may have been forwarded to us by individuals seeking information, but we have not any machinery for the collection of samples generally. Much would be effected if manufacturers would state the composition of the feeds they offer for sale.

By Mr. Owen:

Q. You have no machinery for obtaining samples of feeds?

A. No, not for the general collection of samples of these foods which are offered for sale and having them analysed. You are doubtless aware, that in connection with commercial fertilizers, the work of collection and analysis is done by the Inland Revenue division. The officers of that department collect the samples, duly label them and forward them to the laboratory of the Inland Revenue Department. If this work is undertaken in a systematic way it will have to be done in some manner, either by the Inland Revenue Department or by some other department of the government service that has the necessary machinery; that is a matter to be decided upon later but the first thing to do is to determine if it is desirable to control, in some such way as I have pointed out, the sale of feeding stuffs. Nearly every state in the Union, within the last five years, has adopted some law in connection with the sale of these concentrated feeds; while the law is not the same in every state, almost every state in the Union insists that the vendor or manufacturer must place upon each and every package of the feed, a tag stating the percentage of protein and fat the feed contains. I think we should do the same in Canada. You will find that the farmers are very warmly in favour of some such action on the part of the government, and you will also find, I think, if you make inquiries among the better class of manufacturers, the men who are turning out a high quality of gluten meal and linseed meal and so forth, that they are also favourable towards such an enactment. It is desirable that the farmer should be able to buy according to the actual feeding value of the feed.

By Mr. Owen:

Q. Do you, during your spare time, make it a practice of lecturing to the farmers throughout the country?

A. No, we cannot be said to have any spare time.

Q. You have no means of reaching the farmer?

A. Oh, yes, we have, it would not be right to allow that impression to go abroad.

Q. Well, will you please explain that?

Q. When an invitation comes from an agricultural association or a convention for some member of the staff to attend, that request is forwarded to the Minister of Agriculture, if it has not already been sent to him direct, and it is for him to say whether one or two, as the case may be, of the officers of the experimental farm shall attend to give the information required or to address the convention or association. As a matter of fact we have two or three of our staff now engaged in such work. My first assistant Mr. Charron, is in the province of Quebec and has been there for the past month lecturing at meetings of farmers. Personally, of course, I cannot attend to the Farmer's Institute work, but I do go to a number of the larger agricultural conventions, either dairying or fruit growing conventions, as the case may be, sometimes in one of the Maritime Provinces, sometimes in Ontario, but we do not make it a practice, you understand, of making an itinerary ourselves amongst the Farmers Institute; it is only upon request that we attend.

Q. And you would have to depend a great deal upon these farmers who attend the conventions carrying the knowledge that you convey to them or the members attending this Committee, to the farmers generally?

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A. Yes. As I have said our annual reports contains these analyses and they have a very extensive circulation. Again, there is the wide circulation of the 'evidence' given before this Committee; that is a valuable means of disseminating information. I have referred already to the correspondence, which is very heavy, I am every day answering questions sent by farmers with respect to feeds, fertilizers, etc., so that our farmers have the means, if they will only avail themselves of them, of obtaining that information. No doubt there are some people who either do not know or do not avail themselves of the opportunity of acquiring information in this matter. All this, in my opinion, does not do away with the advisability for parliament to enact some law which will compel the manufacturers to label their materials in the manner I have suggested.

By Mr. Wright:

Q. With respect to the distribution of your evidence, I believe it is the custom to give each member of the House of Commons some 65 or 70 copies of the evidence of each witness appearing before the Committee, I presume some of the members send out those copies to the farmers in their constituencies? In addition to that you have a mailing list?

A. Yes.

Q. But only the farmers who send in a request for the reports get them?

A. Yes, but nevertheless our mailing list contains many thousands of farmers' names.

Q. But that number will only comprise a very small portion of the farmers of this country; only a very small percentage of those engaged in agriculture will be reached in that way. I think that possibly you might make use of the agricultural newspapers as a channel by which you might reach the farmers of this country. You might induce some of the papers to publish your reports. I think in that way you would reach a far larger number of the farmers in this country?

A. I suppose it would have to be spontaneous on the part of the press. We could scarcely do more than ask them, we could not compel them to publish our reports. Some of the papers use them as it is, but certainly they might do so to a greater extent than at present, to the benefit of their readers.

By Mr. Owen:

Q. Why not put them on the patronage list?

A. I understand there is not any, so far as we are concerned.

By Mr. Sexsmith:

Q. Have you received many samples of feed sent in from the country?

A. The samples I have brought with me are some of those which have been sent in during the past winter. We have analysed between 70 and 80 since the publication of the last report.

By Mr. Barr:

Q. Then you did not get these feeds from the factories?

A. A few of them were sent from the factories.

Q. I thought you got samples from the factories?

A. Not as a rule, they are sent in by farmers.

By Mr. Sexsmith:

Q. These samples came from the people who are using them?

A. Yes, for the most part. If for the purposes of making a comparison we need a sample from some factory, then we send for it. Our general method of procedure, however, is to furnish the information on the samples which are forwarded by purchasers.

BRAN AND SHORTS.

By Mr. Sexsmith:

Q. Have you had any samples of shorts sent in?

A. Yes, and samples of bran also.

Q. How do you find these?

A. The shorts as a rule have been fairly good, that is to say, the variations in composition have been small. I have not noticed anything which I would call adulteration. I have brought with me this morning two samples of bran for your inspection and while they may not be considered extremely poor, they contain a considerable proportion of oat hulls and other foreign matter which reduces their nutritive value. These samples of bran contain from two to four per cent less protein than the genuine bran does. Now that may be accidental, but the fact remains that they contain a considerable proportion of oat hull that reduces the feeding value of the bran.

By Mr. Robb:

Q. Do you mean oat hulls?

A. Yes, largely oat hulls, with broken straw and other foreign matter.

By Mr. Broder:

Q. Have you ever noticed any oat seeds?

A. Occasionally in bran but not frequently. In the finely ground milling by-products it is impossible to say from inspection what the feed may contain. The ground feeds from the elevators are mixtures of uncertain feeding value. They must be analyzed to ascertain what they are worth.

By Mr. Robb:

Q. There is a very large amount of Northwest or Manitoba bran now sent down into this country. How does that compare with the Ontario bran as ordinarily put up?

A. It is very close, extremely close. We made analyses two years ago, of a number of samples of bran and shorts from the western mills as well as the Ontario mills and as a rule the bran of the Northwest wheat runs a little higher in protein but the difference is not a large one. The following tables present our results from the analyses of genuine brans and shorts.

ANALYSIS OF BRANS.

Name of Milling Firm.	Address.	Moisture.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Ogilvie Flour Mills.....	Winnipeg, Man.....	9.73	14.00	4.55	55.18	10.74	5.80
Alexander & Law Co.....	Brandon, Man.....	10.57	15.19	5.19	53.83	9.80	5.42
Lake of the Woods.....	Portage la Prairie, Man....	9.89	14.81	4.68	53.75	10.63	6.24
" "	Keewatin, Ont.....	10.83	14.56	3.60	54.56	10.93	5.52
Goldie Milling Co.....	Galt, Ont.....	12.70	13.25	3.78	54.61	9.56	6.00
Tilsonburg Milling Co....	Tilsonburg, Ont.	11.81	14.19	4.17	54.45	9.70	5.68
Kingston Milling Co	Kingston, Ont.....	10.65	15.31	4.87	52.96	10.35	5.86
Winchester Roller Mills...	Winchester, Ont.....	12.37	14.84	4.12	54.20	9.28	5.19
	Average	11.07	14.52	4.37	54.19	10.14	5.71

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ANALYSIS OF SHORTS.

Name of Milling Firm.	Address.	Moisture.	Protein.	Fat.	Carbo-hy- drates.	Fibre.	Ash.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Ogilvie Flour Mills.....	Winnipeg, Man.....	8·88	15·62	4·83	59·07	7·51	4·09
Alexander & Law Co.....	Brandon, Man.....	9·83	17·00	6·23	59·12	4·43	3·39
Lake of the Woods.....	Portage la Prairie, Man....	9·54	16·03	5·97	59·15	5·41	3·90
" ".....	Keewatin, Ont.....	10·38	16·25	5·50	57·40	6·51	3·96
Goldie Milling Co.....	Galt, Ont.....	12·34	14·62	4·54	58·76	5·74	4·00
Tilsonburg Milling Co.....	Tilsonburg, Ont.....	11·60	16·75	5·61	57·55	4·77	3·72
Kingston Milling Co.....	Kingston, Ont.....	10·81	16·41	5·38	60·07	3·82	3·51
Winchester Roller Mills...	Winchester, Ont.....	12·13	15·15	3·98	60·50	4·80	3·44
Woodstock Roller Mills ..	Woodstock, N.B.....	7·58	15·56	5·09	64·56	4·11	3·10
	Average.....	10·34	15·93	5·24	59·58	5·23	3·68

By Mr. Blain:

Q. Before you leave the subject of feeds, may I ask is there any quantity of feed imported into Canada?

A. Of the gluten feeds?

Q. Yes?

A. No, I do not think there is any brought into Canada.

Q. There is none imported?

A. I do not think so. There is a good deal manufactured in the States, of course, but I believe it is all consumed there. I have not heard of any American brand upon our Canadian market. Probably the prices are higher in the States than here, and if so there would be no object in sending the feeds into Canada.

Q. I was not speaking of prepared feeds?

A. I cannot speak with certainty, but all that I have said this morning refers to Canadian products. No American feed has come under my notice.

By Mr. Barr:

Q. You think the feeds from the west have more seeds in them?

A. The milling and manufacturing products I have been speaking of do not come from northwestern Canada. They are chiefly Ontario products. We have bran and shorts from the west and certain feeds from the elevators.

Q. Well, I will ask you now if that is the case in regard to the feeds coming from the west?

A. In the bran?

Q. In the bran, do you find more noxious seeds?

A. No, on the whole the bran is of a good quality. We have not examined many samples of bran and shorts recently. The two brans I brought here do not contain noxious weed seeds. There is a certain admixture of hull and broken straw, and I cannot believe that that is accidental, but there are no weed seeds. The feeds from the elevators are largely composed of ground weed seeds. Some of them contain a proportion of ground barley, flax, &c.

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OAT PRODUCTS.

For the most part these are low-grade feeds, with a small percentage of protein and a high fibre content. A number of these have been analysed and their composition is given on the chart before you. 'Victor' feed contains about $7\frac{1}{2}$ per cent of protein only and 22 per cent of fibre. 'Quaker oat feed' contains between 8 and 9 per cent protein and 12 per cent fibre. 'Eureka' feed contains 10 per cent protein and 8 per cent fibre. In most of the feeds of this class there is a large proportion of hull and other offal from the mills, which may not be discernable if the feed is finely ground. Some of these contain a sprinkling of cracked corn to help their sale.

By Mr. Sexsmith:

Q. Is the Eureka feed manufactured by a Toronto firm?

A. No, the Eureka feed is manufactured by the Ogilvy Milling Company, whose head office is in Montreal.

From the composition of these three feeds, which I bring before you as examples, it may be gathered that these products from the oatmeal mills and breakfast food factories are generally of very poor quality. We analysed one sent us from Prince Edward Island but which had been imported from Ontario, that contained 2.62 per cent of protein and 32.16 per cent of fibre; it was a worthless feed. Such a material is not worth buying at any price. I have yet to find a feed of this class that was worth the price asked, but yet they appear to compete successfully with bran, gluten meal, gluten feed, etc., products of high feeding value.

Q. Have you a sample of the Quaker Oat Feed?

A. Yes. (Producing sample).

By Mr. Robb:

Q. Oat hull is selling at \$7.00 a ton?

A. I would not like to give \$7.00 a ton for oat hull. There is far better value on the market.

By Mr. Broder:

Q. It would not be as good as hay?

A. No, not nearly so valuable.

These three meals we have just discussed will emphatically impress you with the desirability of giving our farmers information, official information, as to the percentages of protein and fat in the feeds they purchase. You will recognize that we have materials on the market containing 35 per cent of protein—and protein is one of the two constituents that should fix the price of the material—and again others containing not more than one-fourth this amount—and yet the difference in price may be but slight.

By Mr. Sexsmith:

Q. Upon what principle is this Quaker Oat Feed, which has only 8.6 protein, made up?

A. I cannot say exactly, but presumably it is the by-product from the manufacture of oatmeal or certain breakfast foods. It may contain some ground grain—I suppose there is, or the percentage of fibre would be higher.

By Mr. Robb:

Q. Has it not the inner hull of the oat ground very fine?

A. It may.

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Q. Is there any corn in that?

A. There is a certain amount of corn, ground corn, in it. They have a habit of putting in a certain amount of corn, to aid in the selling of the material I imagine. You will see these are all types of low class feeds and the point is, they are fetching prices on the market far above their real value.

PEA PRODUCTS.

I should like to say a word or two with regard to pea meal. The genuine article is a material of high feeding value. It will contain in the neighbourhood of 35 per cent of protein, which is highly digestible, and it will not contain more than 4.5 per cent of fibre. Pea meal, however, is a material which is not rich in fat. Its essential constituent is protein and it is very valuable for supplying that nutrient. We find that many of the pea meals upon the market are far below the genuine article. I have brought with me two samples of pea meals which were forwarded to me during the past winter and they are both of inferior quality.

Q. What is the difference between these and the genuine pea meals?

A. They are adulterated by an admixture of pea hull, making a poor quality of pea meal. They contain an extraordinary proportion of pea hull. You will understand that in the manufacture of split pea for soup purposes, the hulls are separated and consequently a considerable number of hulls accumulate. Now the hull of the pea is an extremely poor food. The hull or bran of the pea contains only 5 per cent of protein and over 50 per cent of fibre, consequently if the pea hulls are put in with the ground peas it must reduce the proportion of protein and increase the percentage of fibre in the resulting meal very largely. That sample which I have shown you contains a large admixture of pea hulls. Almost every sample that we have received this winter—we have not received very many certainly—has been found to be largely admixed with pea hulls.

By Mr. Broder:

Q. You could not get peas without hulls?

A. No, we cannot get peas without hulls. You will see from the chart that in genuine pea meal there is 22.5 per cent protein but in those samples which I have handed to you for inspection, we have in one case 14 per cent and in the other 17 per cent of protein. It is evident, therefore, that one of these meals is worth little more than one-half of what the genuine pea meal is worth. This furnishes you with another example which will impress you with the desirability of compelling these materials to be sold according to guaranteed protein content.

By Mr. Smith (Middlesex):

Q. In the pea brans which are of the poorest quality there seems to be a larger percentage of fat than in the pure sample?

A. That is true, but in this case fat is of minor significance. The percentage of fat in pea bran is .44 a trifle under one-half of one per cent. The percentage of fat in the whole peas, that is in the kernel and the hull ground together is slightly over 1 per cent. Fat is very low in peas generally.

Q. I notice that in the samples there, the poorer qualities are higher in the percentage of fat than the pure meal?

A. Yes, they are slightly higher, it is true, but the difference is very small.

COTTON SEED MEALS.

Now I might pass on to speak of another class of foods, cotton seed meal, which though not largely used in Ontario, is fed considerably by the farmers of the Maritime Provinces. It comes generally by water freight from Florida and the Southern States.

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There are several qualities of cotton seed meal upon the market. The genuine meal is one of high food value; its protein content is between 30 and 40 per cent besides some 10 per cent oil or fat, all of which makes it a highly concentrated food. I have brought two samples with me which may be considered as typical. One is a first-class cotton seed meal and the other an extremely poor one. Those who are conversant with this class of feed would have no difficulty in assigning a lower value to this sample from Barbados than to this other sample which I present to you under another name. The percentages of protein in these two, which I have handed to you are 26 and 43 respectively. It is scarcely necessary for me to emphasize the tremendous difference in food value of these two samples.

Q. This sample from Barbados contains 26 per cent of protein only?

A. Yes, it contains a very large proportion of hull, which lowers the protein content, increases the indigestible fibre and makes the feed of very inferior quality.

OIL CAKE MEAL.

By Mr. Hodgins:

Q. What is the food value of flaxseed?

A. Linseed meal or oil cake meal, as it is generally termed, will run about 32 per cent of protein and from 9 to 12 per cent of oil or fat. It is one of our most valuable feeds for supplying protein and fat and has deservedly won a high reputation among feeders. Oil cake meal is a by-product, the residue from the extraction of linseed oil from flax seed. The meal of flax seed (ground flax-seed) is but little used in feeding.

Q. And the food value of oil cake meal is high?

A. Yes, it is one of the most concentrated feeds. I think it is worth now about \$30 a ton, and it is undoubtedly a very excellent food and worth the money, compared with the price other foods are now bringing. All the samples I have examined from Canadian mills have been of good quality.

Q. A great many farmers use the meal from their own flax-seed?

A. Possibly so, but I cannot speak definitely on that point. It would be a very valuable feeding stuff.

MOLASSES FOODS.

The National Molasses Stock food consists of dried exhausted beet pulp to which molasses has been added, and while this material is not rich in protein, it contains a notable amount of sugar; it is a palatable feed of considerable value. 'Molasket Feed' is a material prepared from crude molasses and peat.

By Mr. Sexsmith:

Q. Peat?

A. Yes, with peat which is used as an absorbent, as a vehicle or means which allows the molasses to be used in convenient form.

Q. That is added, I suppose, to increase its weight?

A. No, not necessarily. Peat is used very largely in Germany to mix with molasses; the product is there a feed of recognized value.

Q. There is lots of peat up in Peterboro county but I did not know it was used for cattle food?

A. You must not suppose that the animal obtains any benefit from the peat which is associated with the molasses; the peat is used as an absorbent; it provides for the presentation of the molasses in an acceptable, convenient form. It has also another function. It is known that the molasses fed alone, owing to the potash salts which it contains, has a laxative effect upon the animal; if peat is associated with it larger

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quantities of molasses can be used without the laxative effect being noticed. It is evident, therefore, that peat acts as a corrective, correcting the laxative action of the molasses.

Q. Is not the peat a detriment to the animal?

A. No. There is no nutritive value in the peat, but used in this way it is not injurious to the animal. It acts, I presume, largely as so much indigestible vegetable fibre.

By Mr. Barr:

Q. What does molasses consist of?

A. It is a solution of uncrystallized sugars, and occurs as a by-product in the refining of sugar.

Q. What kind of sugar?

A. Beet sugar and cane sugar.

By Mr. Sexsmith:

Q. What would be the commercial value of peat and molasses feed?

A. I cannot give you the price at present, but think it is in the neighbourhood of \$18.00 to \$20.00 per ton. It is a material which must be valued simply from the amount of sugar that it contains; it is not a feed that furnishes protein. Molasses feed contains 56.89 per cent total sugar, of which 34.08 per cent is cane sugar and 22.81 per cent invert sugar. The use of sugar, as in molasses and molasses feeds, undoubtedly adds to the nutritive value of the ration, for practical experience has shown that in addition to its function as a heat producer in the system, sugar may be employed, within a reasonable limit, as a fattening agent. Apart from their direct food value, these sugar feeds are stated to act beneficially in increasing the appetite, stimulating the digestion and in keeping the animal in a thrifty condition.

Q. But it must have some relative value?

A. Yes, it has a relative value, that is quite true. That value, as I have pointed out, is dependent upon its percentage of sugar.

Q. Will you tell us how it would compare with other feeds?

A. That I can scarcely do, for it is in a class by itself. Other feeds are bought for their protein and fat, this feed has practically neither; it is not a concentrated food. It could not be used to 'balance' the ration, that is, to increase its protein content, it would be necessary for the best returns, to feed in association with other feeds that more particularly furnish protein, such as gluten meal, bran, or oil cake meal. But there is no doubt it is an appetizing material and that the sugar in it is highly digestible and that this sugar has a considerable value in the animal economy, both for the development of heat and energy and also for the production of fat.

By Mr. Smith (North Middlesex):

Q. Does not one of the values of that peat molasses lie in the fact that it makes other feed—probably very rough feed—more palatable?

A. Yes. I think it may have a value in that respect because it is undoubtedly a palatable and appetizing material. These remarks, of course, apply to other feed which I have shown you, consisting of dried exhausted beet pulp to which molasses have been added.

By Mr. Nantel:

Q. What is the price of these feeds?

A. I think they are selling at about \$18.00 or \$20.00 a ton, but the exact price to-day I cannot give you.

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BENTS MILK ALBUMEN.

The sample which I now exhibit is a new material which has recently been put upon the Canadian market; it is an American product. It is used more particularly in the feeding of poultry. It is a very high grade material and appears to be a by-product in the manufacture of milk sugar. In other words it consists largely of the casein or curd of milk which has been separated, dried and ground. There are two grades, one containing about 40 per cent, the other about 70 per cent of protein, consequently both are extremely concentrated materials. They can only be used in small quantities, on account of their high protein content, but used judiciously they appear to give good returns. They are high priced materials, in the neighbourhood of three cents per pound, I believe. Our experience with them is as yet limited, but if the price is not too high I believe they will be found of value in poultry feeding, for laying and fattening stock.

CONDIMENTAL FOODS.

By Mr. Sexsmith:

Q. Have you ever had any samples of stock foods, condimental foods, sent in to you?

A. Yes, we have and they have given us a great deal of trouble in their analysis. We do our best to point out to farmers that they are not worth the money asked for them. It is only a day or two ago that a sample was sent to us; it was a pound package with the price 50 cents on the label. The printing thereon was in French and the announcement was made on the bottom of the label that it was prepared by a certain Dr. Macdonald of the Experimental Farm at Ottawa. Of course, there is no such person at the Experimental Farm. Unfortunately we have not succeeded in tracing the habitat of the manufacturer so that we have been unable to prosecute him. This material is sold, as I have said, from 50 cents a pound and I presume it is worth between 3 and 4 cents, certainly not more than 10 cents.

By Mr. Rutan:

Q. Have you ever had herbageum sent in to you?

A. Yes, and you will find the analysis in my reports of 1904 and 1905. It contains about 20 per cent protein and 5 per cent fat. It is made with bran, wheat refuse and some linseed meal. It contains sugar, salt, charcoal and fenugreek. At that time I took up this matter of the condimental food stuffs and showed that they were being sold at fabulous prices, from the nutritive standpoint. We discountenance the purchase of the foods in emphatic language but their sale continues. It would be far better for the farmer to buy good wholesome feeds at reasonable prices and use them rationally.

By Mr. Sexsmith:

Q. What if they are sold as medicine?

A. If they are sold as medicines, again, I say, their price is extravagantly high. What are the drugs used in compounding them? Saltpetre, charcoal, sulphur, sulphate of iron, salt, gentian root, fenugreek, &c. They are all low-priced drugs. Some of them are only worth 3, 4 and 5 cents a pound and none of them more than 10 cents a pound, if my memory bears me out. If the animals require medicine, it would be cheaper and better from every point of view for the farmer to purchase at the drug store what he wants and to doctor the animals according to the ailment.

Q. Have you ever had any experience of the international stock feed? It must be very cheap because it costs them, they say, over two millions a year in advertising?

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Q. Yes, we have analysed that feed and it has a very low value compared with its price. It contains about 13 per cent protein and 4 per cent fat. It is made from 'wheat feed.' It contains salt, charcoal, fenugreek and probably gentian. None of the constituents are costly.

By Mr. Smith (North Middlesex):

Q. At Washington that feed was analysed and the report said the cost was 1 cent a pound?

A. I daresay such is the case. The factories are situated in Minneapolis where there are large flour mills and necessarily a tremendous amount of refuse and waste products accumulates. This is largely used no doubt in the compounding of the feed. The sale of this feed is tremendous and all sorts of schemes are employed to advertise it, for the profits are large. It is difficult to understand why farmers will persist in buying these condimental foods, especially when their nature has been made public in our reports and the agricultural press.

By Mr. Sexsmith:

Q. The manufacturers say their cost for advertising is \$2,000,000 a year. Who pays for that?

A. The consumer, the purchaser.

Q. The farmer?

A. Yes, there can be no doubt as to who pays for the advertising and also the large dividends. It is a profitable business, once it is well advertised.

By Mr. Rutan:

Q. There is an awful amount of that stock feed sold throughout the west, tons of it?

A. Possibly. We do all we can to keep the farmer posted as to the character of these materials. We give him all the information necessary to form a judgment as to their true value, but we cannot prevent him buying them. We find no occasion on the Experimental Farm to use them nor do the best feeders and dairymen.

By Mr. Hodgins:

Q. Speaking of oil cake meal, there is a lot of it used by the farmers but there is an impression that it is too strong a feed to use?

A. It cannot be used alone; it is too concentrated. But it is valuable as a part of the ration in supplying protein and fat. The quantity that can be used profitably in the meal ration, will largely depend on the requirements of the animal.

Q. How about pea meal?

A. It is, if genuine, a concentrated feed and must be used in conjunction with foods of lower protein content, in the same way as I have described for oil cake meal.

Q. It is a strong food?

A. Yes. It is one of the strongest foods. Mixed with shorts and crushed oats it makes a valuable feed for pigs. It can similarly be used for the other classes of stock.

Q. It is as strong as cotton seed meal?

A. No, but nevertheless it is a concentrated feed. These highly concentrated meals are used to 'balance the ration' and supply protein and fat in which the home grown coarse fodders are not rich. The latter (hay, roots, straw, etc.), contain less protein and fat than oil cake, gluten meal, cotton seed meal, linseed meal, and hence it is necessary to supplement them, as I have described for the best returns. No feeder of experience would think of using oil cake meal, or cotton seed meal or pea meal alone.

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Q. What would you recommend along with linseed meal?

A. It may be used in connection with bran, shorts, crushed oats and barley. These feeds contain less protein than the linseed meal but will serve to give bulk to the ration and make it more digestible. Highly concentrated feeds, that is those very rich in protein and fat, must be fed, carefully and judiciously, both from the standpoint of profit and the health and thrift of the animal. Cotton seed meal, especially, must be fed carefully or the digestion of the animal will be deranged.

By Mr. Smith (Middlesex):

Q. These concentrated foods, for instance, whole flax-seed ground mixed with bran, bring up the balance of the ration in connection with ensilage?

A. Yes, they supply the protein and fat, in other words they balance the ration and serve to satisfy the requirements of the animal. Ensilage and roots, though valuable, do not furnish sufficient protein for the wants of the animal, and therefore, their use is supplemented with one or more of the meals we have been considering. The ration is compounded having in mind, the age and function of the animal and the nature of the feeds available.

The hour of adjournment having arrived the witness retired.

Committee adjourned.

Having read over the preceding transcript of my evidence, I certify the same to be correct.

FRANK T. SHUTT,

Chemist.

